

Notice of Allowability

Application No.

10/606,854

Examiner

Tuan N. Nguyen

Applicant(s)

HARTLOVE ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 06/13/2005.
2. ☒ The allowed claim(s) is/are 1,4-7,9,10,21-25,29,31-34 and 38-42.
3. ☒ The drawings filed on 26 June 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>7/25/2005</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

Response to Amendment

1. In responding to applicant's response filed 06/13/2005, claims 1, 4, 21, 29, 33 were amended, claims 2, 3, 11-20, 26-28, 37 have been canceled, and claims 39-44 have been added.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below, to the amended claims 1, 21, 33. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview on July 25, 2005 with Mr. John A. Miller (Attorney for Applicant, Reg. No. 34985).

Claims 1, 21, 33:

1. (Currently Amended) An extreme ultraviolet (EUV) radiation source for generating EUV radiation, said source comprising:

a device for generating at least one stream of a target material, said target material being directed towards a target area;

a first laser source generating a pre-pulse laser beam directed towards the target area; and

a second laser source generating a main pulse laser beam directed towards the target area, said pre-pulse beam having a lower intensity than the main pulse beam, wherein the first laser and the second laser are timed so that the pre-pulse beam arrives at the target area

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before the main pulse beam, and wherein the main pulse beam interacts with the target material to generate the EUV radiation, and wherein the main pulse beam and the pre-pulse beam impinge the target area at an angle of 30° or greater between the beams, and wherein the pre-pulse beam has an energy of about 10-40 mJ and the main pulse beam has an energy of about 0.1 to 1 J.

21. (Currently Amended) An extreme ultraviolet (EUV) radiation source for generating EUV radiation, said source comprising:

a device for generating at least one stream of a target material, said target material being directed towards a target area; and

a system for generating a main pulse laser beam and a pre-pulse laser beam, wherein the main pulse beam and the pre-pulse beam are timed so that the pre-pulse beam arrives at the target area before the main pulse beam, and wherein the pre-pulse beam generates a weakly ionized plasma at the target area and the main pulse beam generates the EUV radiation, and wherein the main pulse beam and the pre-pulse beam impinge the target area at an angle of 30° or greater between the beams, and wherein the pre-pulse beam arrives at the target area in the range of 20-200 ns before the main pulse beam.

33. (Currently Amended) A method for generating EUV radiation, comprising:

directing a stream or streams of a target material towards a target area;

directing a pre-pulse laser beam towards the target area; and

directing a main pulse beam towards the target area, wherein the pre-pulse beam arrives at the target area before the main pulse beam, and wherein the pre-pulse beam generates a

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weak plasma at the target area and the main pulse beam interacts with the plasma to generate the EUV radiation, and wherein the main pulse beam and the pre-pulse beam impinge the target area at an angle of 30° or greater between the beams; and [.]

setting the timing between the pre-pulse beam and the main pulse beam to control the intensity of the EUV radiation, wherein setting the timing includes reducing the time between the pre-pulse beam and the main pulse beam so that the intensity of the EUV radiation is a predetermined amount less than its maximum intensity.

Claim 8 is CANCELED.

Claim 30 is CANCELED.

Claim 37 is CANCELED.

REASON FOR ALLOWANCE

Allowable Subject Matter

3. The following is an examiner's statement of reasons for allowance, with respect to claims 1, 21, 33, 40 the references of the record fail to teach or suggest:

Claim 1:

An extreme ultraviolet (EUV) radiation source comprising a device to generating a stream of a target material to a target area, a low intensity pre-pulse arrives before a main pulse beam, where the main pulse beam interacts with the target material to generate EUV radiation, *wherein the main pulse beam and the pre-pulse beam impinge the target area at an angle of 30°*

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or greater between the beams, and wherein the pre-pulse beam has an energy of about 10-40 mJ and the main pulse beam has an energy of about 0.1 to 1 J.

Claim 21:

An extreme ultraviolet (EUV) radiation source comprising a device to generating a stream of a target material to a target area, a low intensity pre-pulse arrives before a main pulse beam, where the main pulse beam interacts with the target material to generate EUV radiation, pre-pulse beam generates a weakly ionized plasma at the target area and the main pulse beam generates the EUV radiation, *and wherein the main pulse beam and the pre-pulse beam impinge the target area at an angle of 30° or greater between the beams, and wherein the pre-pulse beam arrives at the target area in the range of 20-200 ns before the main pulse beam.*

Claim 33:

An extreme ultraviolet (EUV) radiation source comprising a device to generating a stream of a target material to a target area, a low intensity pre-pulse arrives before a main pulse beam, wherein the pre-pulse beam generates a weak plasma at the target area and the main pulse beam interacts with the plasma to generate the EUV radiation, *and wherein the main pulse beam and the pre-pulse beam impinge the target area at an angle of 30° or greater between the beams; and setting the timing between the pre-pulse beam and the main pulse beam to control the intensity of the EUV radiation, wherein setting the timing includes reducing the time between the pre-pulse beam and the main pulse beam so that the intensity of the EUV radiation is a predetermined amount less than its maximum intensity.*

Claim 44:

An extreme ultraviolet (EUV) radiation source comprising a device to generating a stream of a target material to a target area, a low intensity pre-pulse arrives before a main pulse beam, wherein the pre-pulse beam generates a weak plasma at the target area and the main pulse beam interacts with the plasma to generate the EUV radiation, and wherein the pre-pulse beam generates a weakly ionized plasma target area and the main pulse beam generates the EUV radiation, *wherein the main pulse beam and the pre-pulse beam are separate by an angle of 30° or greater at the target area, and wherein the pre-pulse beam has an energy of about 40 mJ and a duration of about 10 ns and the main pulse beam has an energy of about 700 mJ and a duration of about 10 ms.*

4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Communication Information

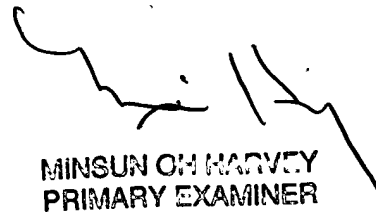
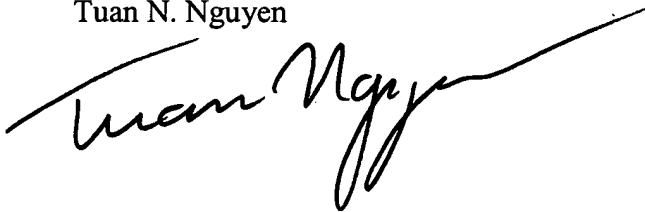
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan N Nguyen whose telephone number is (571) 272-1948. The examiner can normally be reached on M-F: 7:30 - 4:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harvey Minsun can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan N. Nguyen



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PRIMARY EXAMINER